

REMARKS

This amendment is in response to the Office Action dated September 17, 2009 (the Action).

I. Status of the Claims

Claims 13-25 stand rejected under 35 U.S.C. 101 as being allegedly directed to non-statutory subject matter. Claims 1-11, 13-23 and 25-27 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,285,502 to Walton et al ("Walton") in view of U.S. Patent No. 4,490,585 to Tanaka ("Tanaka") in view of U.S. Patent No. 7,483,540 to Rabinowitz et al. ("Rabinowitz"). Claims 12 and 24 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Walton, Tanaka and Rabinowitz in further view of U.S. Patent No. 4,109,107 to Boast ("Boast").

Applicants request reconsideration in view of the above amendments and the remarks that follow.

II. The 35 U.S.C. 101 Rejections

The Action takes the position that Claims 14-25 recite a method for frequency adaptation of an audio signal with no claimed circuit elements or devices performing the method. Accordingly, Claim 14 now recites that the steps are performed by a control circuit, and is tied to a machine as apparently required in the Action.

Thus, Applicants submit that Claims 14-25 recite statutory subject matter and request that the rejections be withdrawn. However, if the rejection is maintained, Applicants respectfully solicits the Examiner's suggestion as to a satisfactory amendment.

III. The 35 U.S.C. 103 Rejections

Claim 1 recites as follows:

1. (Currently Amended) A control circuit for a signal strength information dependent frequency response adaptation of an audio signal for an electrodynamic transducer, the circuit comprising:
 - a signal strength information determination means for determining

a signal strength information according to a level of the audio signal, and
- a frequency modifying means for selectively modifying the audio signal in response to the signal strength information to adapt the frequency response of the audio signal to the electromechanical properties of the electrodynamic transducer such that the electrodynamic transducer converts the audio signal into a low distortion sound signal for high levels of the audio signal and has a flat frequency response for low levels of the audio signal,

wherein a lower frequency range of the audio signal is modified with a gain that is different than a gain of a higher frequency range of the audio signal, and a cutoff frequency separating the lower frequency range from the higher frequency range is shifted towards higher values for an increasing level of the audio signal and towards lower values for a decreasing level of the audio signal, the cutoff frequency being the same or lower than a resonant frequency of the electrodynamic transducer for low-level audio signals.

Claims 14, 26 and 27 include recitations analogous to Claim 1. Claims 1, 14, 26 and 27 have been amended to clarify that the cut-off frequency is the same or lower than a resonant frequency of the electrodynamic transducer for low-level audio signals. Support for the above amendments can be found in paragraph [0046] of the application.

As discussed in the responses of March 5, 2009 and August 19, 2009, Walton and Tanaka relate to hearing aids adapted to filter out background noise. Accordingly, Walton and Tanaka do not mention or suggest that the frequency response of the audio signal may be adapted to the electromechanical properties of an electrodynamic transducer. Walton and Tanaka rely on an audio signal recorded by a microphone and including noise components, and the noise components are used to generate a control signal. In stark contrast, the current claims relate to avoiding sound distortion at high signal levels for an audio signal, e.g., by adapting the frequency response of the audio signal to the electromechanical properties of the electrodynamic transducer such that the electrodynamic transducer converts the audio signal into a low distortion sound signal for high levels of the audio signal and has a flat frequency response for low levels of the audio signal as recited in the current claims.

The Action concedes that Tanaka and Walton do not disclose that the frequency response of the audio signal is adapted to the electromagnetic properties of the

electrodynamic transducer. Rabinowitz is cited for the first time in the Action as allegedly disclosing an audio compensation system for adapting the frequency response of a signal to fit the electromechanical properties of an electrodynamic transducer at column 5, lines 53-63 and column 6, lines 18-47. However, even if Rabinowitz were combined with Walton and Tanaka, Applicants submit that the cited art, alone or in combination, would not disclose the recitations of the independent claims.

Rabinowitz generally relates to an automated equalizing system for audio systems. Rabinowitz uses a microphone to measure the frequency response of the audio system, calculates an equalization pattern to obtain a desired frequency response, applies the equalization pattern to an audio signal, and reproduces the audio signal with a set of loudspeaker units. *See* Abstract. The cited portion of Rabinowitz discusses that data signals representing characteristics of loudspeaker units may be stored in a memory of the audio system, and if a calculated equalization pattern could compromise the performance of an acoustic drive unit of a loudspeaker by damaging the unit or by causing distortion or clipping, the equalization pattern may be modified to avoid overdriving the acoustic unit. Rabinowitz further discusses that either an audio signal processing circuitry of the audio system or the loudspeaker units may include crossover circuitry, *e.g.*, for driving low and high frequency acoustic drivers. It is noted that Rabinowitz discusses a single crossover frequency. *See* col. 4, lines 4-8.

However, the independent claims recite an adaption of the frequency response of the audio signal to the electromechanical properties of the electrodynamic transducer by shifting the cut-off frequency, so that at high audio signal levels, a low distortion sound signal is obtained and at low audio signal levels, a flat frequency response of the transducer is obtained. In contrast, the equalization pattern of Rabinowitz is not chosen in response to a level of the audio signal, but rather to achieve a desired frequency response. The frequency response in Rabinowitz is apparently independent of the audio signal level, and the generation of a flat frequency response when the signal level is lowered is not disclosed or rendered obvious by Rabinowitz. In particular, Rabinowitz makes use of a crossover circuit such that

even at low audio signal levels, the frequency response after the audio signal processing circuit is not flat in contrast to the recitations of the independent claims.

In addition, Rabinowitz clearly modifies the audio signals by applying the equalization pattern to the audio signal rather than shifting a cut-off frequency as recited in the current claims. The equalization pattern generally increases the gain in some frequencies and lowers the gain in others, and thus, the equalization pattern cannot be considered analogous to a cut-off frequency. The Office Action states on page 4 that the cut-off frequency of the current claims is analogous to the crossover frequency of the crossover circuit of Rabinowitz. However, the crossover frequency of a crossover circuit of a loudspeaker is generally fixed because it is adapted to the loudspeaker drivers, the loudspeaker chassis and other physical properties of the loudspeaker unit.

Accordingly, there is no apparent reason to combine Walton and Tanaka with Rabinowitz with any reasonable expectation of success. For example, if the frequency shifting as taught by Tanaka were applied to the audio system of Rabinowitz, the crossover frequency would be shifted, which would appear to have a negative impact on the sound reproduction by the loudspeaker. Thus, the cited art teaches away from such a combination. In addition, if the equalization pattern modifications according to Rabinowitz were applied to the audio signal of Tanaka, the cut-off frequency of Tanaka would apparently be shifted in response to background noise rather than being adapted to the electromechanical properties of the electrodynamic transducer.

In contrast, the current claims recite that the frequency response of the audio signal is adapted to the electromechanical properties of the electrodynamic transducer such that the electrodynamic transducer converts the audio signal into a low distortion sound signal for high levels of the audio signal and has a flat frequency response for low levels of the audio signal. In addition, the claims recite that a lower frequency range of the audio signal is modified with a gain that is different than a gain of a higher frequency range of the audio signal, a cutoff frequency separating the lower frequency range from the higher frequency range is shifted towards higher values for an increasing level of the audio signal and towards

lower values for a decreasing level of the audio signal, and the cutoff frequency is the same or lower than a resonant frequency of the electrodynamic transducer for low-level audio signals.

Notably, Rabinowitz does not even mention a resonant frequency of an electrodynamic transducer, and therefore, Rabinowitz cannot disclose that the cut-off frequency is the same or lower than the resonant frequency for low-level audio signals as maintained in the Action.

The missing elements of Walton, Tanaka and Rabinowitz are not disclosed by Boast, which is cited with respect to Claims 12 and 24.

For at least the reasons discussed above, Applicants submit that the recitations of the independent claims are not disclosed or rendered obvious by the cited prior art and request that the rejections under 35 U.S.C. 103(a) be withdrawn.

CONCLUSION

Accordingly, Applicants submit that the present application is in condition for allowance and the same is earnestly solicited. Should the Examiner have any matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,



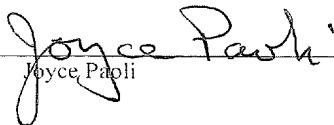
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